Remarks

Claims 14-63 are withdrawn. Claims 1-13 remain in the application and are patentable over the art of record.

In the Office Action, claims 1-11 were rejected under 35 U.S.C. §102(e) on the basis of Bryant et al. U.S. Patent 6,264,765, as follows:

> Bryant et al. disclose the method for producing an aluminum alloy, AA5754 alloy (table 2), comprising the steps of providing a source of molten aluminum providing a caster, rolling the caster into a sheet product, continuously annealing the sheet product at a temperature in a controlled temperature range, measuring the degree of recrystallization of the sheet product (col. 5, lines 55-60), relaying the signal to the controller (23), wherein the controller, comparing the signal to previous signals relating to degree of recrystallization of the sheet product to provide a comparison, and in response to the comparison, maintaining or changing the temperature upward or downward to produce desired recrystallization (col. 5, lines 40-67). The hot mill entry temperature is in the range of 700 to 1100 degrees C (col. 6, line 23). The twin belt casting is to produce a slab of 0.2 to 2 inches thick (col. 4, line 41). Hot rolling of the slab to a thickness in the range of 0.01 to 0.25 inch (col. 4, line 46).

Applicants have contrasted their invention with conventional technology in their application at page 12, ¶0037 as follows:

> **[0037]** This process is to be contrasted with conventional technology wherein casting, hot rolling, and annealing take place to produce a roll or coil of sheet product and ***samples are then cut from the roll to determine if the sheet product contained in the roll has acceptable texture and grain structure for forming***. If the roll of sheet product does not have acceptable texture or grain structure, then it has to be ***reprocessed*** or ***scrapped***. (Emphasis added.)

The Bryant et al. reference is considered by Applicant as part of the conventional technology because if it does not have acceptable texture or grain structure, it has to be scrapped. It should be noted that Bryant et al. is ***silent*** with respect to controlling grain structure or recrystallization. That is, in Applicants' invention, as noted at page 11, ¶0035, third line from the bottom:

> . . . the process is controlled to change operating conditions on-line in real time, such as hot rolling temperature and annealing temperature, for

example, to obtain sheet product having the fully recrystallized fine grain structure sometimes referred to as primary recrystallization. Care is required to avoid over annealing and the growth of fine grains to provide large grains or abnormal grain growth referred to as secondary recrystallization which lead to low formability and high earing.

It will be appreciated that the present invention has the capability to consistently and continuously produce aluminum alloy sheet product having highly desirable texture and grain structure, e.g., completely recrystallized, for improved forming with low or optimum earing.

Applicants' invention is concerned with measuring the degree of recrystallization or grain structure and uses this measurement to control the process, as follows:

[0049] In accordance with the invention, the texture and/or grain structure of hot rolled or annealed sheet product is measured on a continuous basis using texture and grain structure analyzer 60 and a texture and grain structure related signal is directed along line 62 to controller 100. In response thereto, operating conditions such as hot rolling temperature, hot rolling reduction and/or speed, mill coolant, or anneal temperature, can be adjusted, if necessary, to provide a sheet product having the desired texture and grain structure. Thereafter, sheet product 42 may be cut by shear 44 and coiled into coils 48 and 49. Thus, it will be seen that using the on-line texture and grain structure analyzer optimum conditions can be maintained to produce a sheet product having texture and grain structure which provides, for example, high formability and low or optimum earing resulting in minimal scrap generation or reprocessing of coils having unsuitable forming characteristics.

[0050] That is, the on-line texture and grain structure analyzer 60 measures the quality of sheet product, for example, from the hot rolling or annealing operations, depending on the process, and generates a texture and grain structure signal or measurement. This signal or measurement is relayed to controller 100 along line 62. Controller 100 is set up to compare the present texture and grain structure measurements with prior texture and grain structure measurements or a standard or range of texture and grain structure measurements. Controller 100 then determines, for example, if the temperature of sheet in annealer 40 should be maintained or adjusted upwardly or downwardly within a controlled temperature range to maintain or improve the texture and grain structure and thus maintain or improve formability of the sheet product being produced. Likewise, hot rolling temperature may be maintained or adjusted upwardly or

> downwardly individually within a controlled temperature range or in conjunction with anneal temperature to maintain or improve the texture and/or grain structure suited to the desired levels of formability and/or earing.

Thus, it will be seen that Applicants' invention is concerned with a completely different invention from that described in Bryant et al. Bryant et al. describes and claims the use of ***inductive*** heating and states this fact in col. 1, lines 7 to 13, as follows:

> The present invention is directed to an improved method and apparatus for casting, hot rolling and annealing non-heat treatable aluminum alloys, and, in particular to a method of ***inductively heating*** a cast and hot rolled aluminum alloy sheet directly after hot rolling to continuously produce an annealed aluminum alloy product, thereby eliminating the need for multiple processing lines. (Emphasis added.)

Bryant et al. also states at col. 2, lines 50 to 54, as follows:

> According to the invention, the hot rolled product is directly inductively heated from an elevated temperature caused by the latent heat in the hot rolled product to a final annealing temperature to form a final annealed product.

Further, Bryant et al. notes that the inductive heating is controlled on a heating parameter at col. 2, lines 54 to 58, as follows:

> The inductive heating is controlled using a feedback control based on at least one heating parameter, e.g., the temperature of the hot rolled product entering the induction heating zone. The surface of the final annealed product can be protected prior to coiling.

However, it should be noted that in the process of Bryant et al., coupons must be cut from coils of sheet and analyzed for texture and grain structure, as referred to earlier. That is, Bryant et al. is ***silent and does not disclose*** Applicants' invention. Bryant et al. is ***silent*** with respect to ***on-line*** determination of texture and grain structure during production and immediate or on-line controlling or changing of texture and grain structure to continuously produce sheet having the desired forming and earring characteristics.

Applicants' invention is set forth in claim 1 which is provided as follows for convenience:

> 1. A process for producing an aluminum alloy sheet product having a controlled recrystallization using a continuous caster to cast a molten aluminum alloy into a slab comprising:
>
> (a) providing a source of molten aluminum alloy;
>
> (b) providing a caster for continuously casting said molten aluminum alloy into a slab;
>
> (c) rolling said slab into a sheet product;
>
> (d) continuously annealing said sheet product at a temperature in a controlled temperature range;
>
> (e) measuring degree of recrystallization of said sheet product on a continuous basis to provide a recrystallization related signal;
>
> (f) relaying said signal to a controller;
>
> (g) in said controller, comparing said signal to previous signals relating degree of recrystallization of said sheet product to provide a comparison; and
>
> (h) in response to said comparison, maintaining or changing said temperature in said temperature range upwardly or downwardly to produce aluminum sheet product having desired recrystallization.

It will be seen that Bryant et al. is ***silent*** with respect to step (e) which requires "measuring the degree of recrystallization of the sheet product on a continuous basis to provide a recrystallization related signal".

The United States Patent and Trademark Office indicates that Bryant et al., col. 5, lines 55-60, discloses step (e). Bryant et al., col. 5, lines 55-60 discloses as follows:

> The inventive apparatus is ideally suited for non-heat treatable aluminum alloys such as AA 1000, AA 3000, AA 4000, AA 5000 series. As is known in the art, annealing these materials removes the effects of cold working and promotes recrystallization.

It is respectfully submitted that this is not a teaching of step (e). This is merely stating that annealing promotes recrystallization, which is well known. Clearly, this does not disclose or anticipate Applicants' invention as set forth in claim 1.

For a reference to anticipate, it must set forth ***all*** the features of the claimed invention in a single document. Clearly, Bryant et al. is ***silent*** with respect to

Applicants' step (e). Thus, Bryant et al. cannot anticipate Applicants' invention under 35 U.S.C. 102(e). Further, because Bryant et al. is ***silent*** with respect to step (e), Bryant et al. cannot make Applicants' invention as set forth in claim 1, obvious. Thus, for a first reason, Applicants' invention is patentable over this reference.

It is submitted that Applicants' claim 1 is patentable over Bryant et al. for a second reason. That is, claim 1(f) requires taking the recrystallization related signal and "relaying said signal to a controller". Clearly, Bryant et al. is ***silent*** with respect to relaying a ***recrystallization related signal*** to a controller.

It is submitted that Applicants' invention is patentable over Bryant et al. for yet another reason. In claim 1, step (g), the recrystallization related signal is compared to previous signals relating to the degree of recrystallization to provide a comparison. Again, Bryant et al. is ***silent*** with respect to such step.

Further, it is submitted that Applicants' invention is patentable over Bryant et al. for a fourth reason. In Applicants' invention, claim 1, step (h), it is required that in response to said comparison in step 1(g), the annealing temperature is either maintained or changed upwardly or downwardly to produce sheet having the desired recrystallization. Clearly, it will be seen that Bryant et al. is ***silent*** to this step or series of steps in which the degree of recrystallization is measured and used to control the process. This has the advantage of avoiding coils of scrap because recrystallization can be changed as the sheet product is being produced.

In addition, because Bryant et al. is ***silent*** with respect to these steps, it is submitted that Bryant et al. cannot make Applicants' invention, as claimed, obvious.

Claims 2-13 are patentable over Bryant et al. for the reasons provided above.

It is respectfully submitted that Bryant et al. does not disclose measuring the degree of recrystallization, relaying the recrystallization related signal to a controller, comparing recrystallization related signals to previous signals in a controller or maintaining or changing temperature based on the comparison to produce the desired recrystallization.

In the Office Action, claims 12 and 13 were rejected under 35 U.S.C. 103(a) on the basis of Bryant et al. taken in view of Kamat as follows:

> Claims 12 and 13 rejected under 35 U.S.C. 103(a) as being unpatentable over Bryant et al. (US '756) as applied to claim 1 above in paragraph 5, and further in view of Kamat (US 5,634,991).
>
> Bryant et al disclose the claimed invention above, but fail to teach cold rolling the hot strip after annealing step to a gauge in the range of 0.01 to 0.16 inch.
>
> However, Kamat discloses the method of cold roll after annealing and having a final gauge of 0.02 inch for the purpose of improving formability.
>
> Therefore, it would have been obvious to one of ordinary skill in the art at the time Applicants' invention was made to have cold rolled after annealing as taught by Kamat, in Bryant et al. in order to improve formability.

It is respectfully submitted that claims 12 and 13 are dependent on claim 2, which is dependent on claim 1. Thus, claims 12 and 13 have all the limitations of claim 1. As noted above, claim 1 is patentable over Bryant et al. Thus, it is respectfully submitted that Bryant et al. does not apply to claims 12 and 13 for the reasons set forth above with respect to claim 1. Further, it should be noted that Kamat does not supply the parts missing in Bryant et al. That is, Kamat is concerned with an alloy and method of making the same as follows:

> A method for making aluminum alloy can stock from continuously cast aluminum alloy slabs includes the steps of continuous casting, hot rolling, hot line annealing, cold rolling, intermediate annealing and cold rolling to final gauge. After the material is cold rolled to final gauge, it is subjected to a heat treatment step which improves its formability. The method is suited for improved AA3000 series type alloys. Besides improved formability, the inventive method also provides increased alpha phase content and low earing percentage for improvements in can manufacture. An improved aluminum alloy product also is disclosed.

However, Kamat is ***silent*** with respect to Applicants' method of controlling recrystallization. Thus, Kamat does not supply the parts missing in Bryant et al. Accordingly, it is respectfully submitted that claims 12 and 13 are patentable over this combination.

In view of the above remarks, it will be noted that a sincere attempt has been made to place this application in condition for allowance. Therefore, reexamination and reconsideration are requested and allowance solicited at an early date.

Respectfully submitted,

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Received from < 7247273500 > at 6/6/03 4:06:22 PM [Eastern Daylight Time]